

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problems Mailbox.**

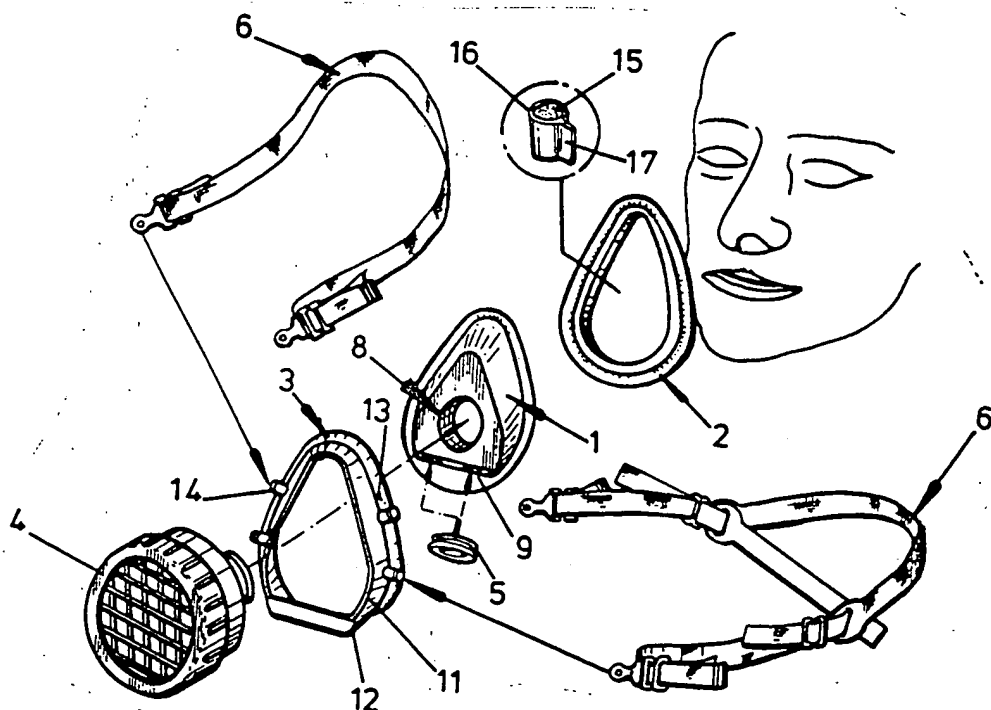
WO 8701950

APR 1987

INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>4</sup> :</b>  <b>A62B 18/02</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 87/ 019</b>  <b>(43) International Publication Date:</b> 9 April 1987 (09.04.87)
<b>(21) International Application Number:</b> PCT/GB86/00576 <b>(22) International Filing Date:</b> 26 September 1986 (26.09.86)  <b>(31) Priority Application Number:</b> 8523795 <b>(32) Priority Date:</b> 26 September 1985 (26.09.85) <b>(33) Priority Country:</b> GB  <b>(71) Applicant (for all designated States except US):</b> PRO- TECTOR SAFETY LIMITED [GB/GB]; Great George Street, Wigan, Greater Manchester WN3 4DE (GB).  <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only) :</b> FEENEY, John, Ro- bert [GB/GB]; Protector Safety Limited, Great George Street, Wigan, Greater Manchester WN3 4DE (GB).		<b>(74) Agent:</b> ATKINSON, Peter, Birch; Marks & Cle Suite 301, Sunlight House, Quay Street, Manches M3 3JY (GB).  <b>(81) Designated States:</b> AT, AT (European patent), AU, E BE (European patent), BG, BR, CF (OAPI pater CG (OAPI patent), CH, CH (European patent), C (OAPI patent), DE, DE (European patent), DK, I FR (European patent), GA (OAPI patent), GB, C (European patent), HU, IT (European patent), J KP, KR, LK, LU, LU (European patent), MC, M ML (OAPI patent), MR (OAPI patent), MW, NL, N (European patent), NO, RO, SD, SE, SE (Europe patent), SN (OAPI patent), SU, TD (OAPI pater TG (OAPI patent), US.  <b>Published</b> <i>With international search report.</i>

**(54) Title:** RESPIRATOR**(57) Abstract**

A respirator having a can-like body (7) associated with an inlet (8) and an air outlet (9) and having a respirator

- 1 -

RESPIRATOR

5 The present invention relates to a respirator and more particularly (but not exclusively) to those respirators known as half-mask respirators which are intended to cover only the nose and mouth of a wearer.

10 Most conventional half-mask respirators are moulded from natural rubber or other similar material (synthetic rubber, silicone rubber, PVC etc.). With this type of mask the face seal is effected by the part of the mask in contact with the face. To achieve this it is usual to have a reflex edge in which region the moulding is thinner and more flexible.

15 Other masks use an inflatable seal against the face and this may be combined with a rubber mask or a rigid plastic mask.

20 With the conventional masks, it may not be possible to replace the seal easily once it has lost its effectiveness due to repeated use of the mask which must therefore be discarded.

It is an object of the present invention to obviate or mitigate the above disadvantage.

25 According to the present invention there is provided a respirator having a cup-like body associated with an air inlet and an air outlet and having a peripheral sealing element shaped for location across the nose and around the mouth of a wearer, wherein the sealing element is located in position by a clamping element which is releasably secured on the cup-like body.

30 Preferably, the cup-like body and clamping element each have flanges which come into face-to-face clamping relationship when the clamping element is mounted on the body, and the seal has a

35

- 2 -

skirt or the like which is clamped between these flanges to retain the seal in position.

The invention will be further described by way of example only with reference to the accompanying drawings in which:

Fig. 1 is an exploded perspective view of one embodiment of half-mask respirator in accordance with the invention;

Fig. 2 is an exploded, part-sectional side view of the mask shown in Fig. 1, but omitting details of the harness; and

Fig. 3 is a side view of the assembled mask.

The illustrated half-mask respirator comprises a cup-like body 1 shaped for location over the nose and mouth of a user, a cushion-like face seal 2 for location on the cup 1, an outer clamping element 3, a standard filter cartridge 4, an inhalation valve 18 (not shown in Fig. 1, but clearly illustrated in Fig. 2), exhalation valves 5 (only one shown), and harness straps 6.

Cup 1 is a rigid plastic moulding formed as a cup-shaped body 7 having an aperture 8 in a flat frontal face thereof and two apertures 9 in a flat basal face thereof. Aperture 8 is extended inwardly by an internally screw-threaded tubular projection 8a in which an air inlet valve 18 (see Fig. 2) is located. Projecting laterally from the rim of the body 7 is an integral flange 10.

Clamping element 3 is also a rigid plastics moulding and comprises a wall 11 with a stand-off guard portion 12. More particularly, wall 11 is shaped to be a close fit around the body 7 save that the guard portion 12 will stand slightly clear of the flat basal face of body 7 to allow the exhaust valves 5 to be positioned in apertures 9. The basal surface

- 3 -

these

of guard portion 12 is slotted so as to allow passage of air from valves 5.

by way  
panying

Also provided on clamping element 3 is a flange 13 integral with the wall 11. Finally, stud-like projections 14 are provided on wall 11.

5

of one  
e with

Complimentary snap-fit formations (not shown) are provided on the wall 11 of clamping element 3 and on the body 7 of cup 1 whereby clamping element 3 is a snap fit on cup 1. The snap fit formations may take a number of forms. For example, the cup-like body 7 may have a continuous or discontinuous undercut in which a complimentary projection on the inner surface of wall 11 locates. With element 3 snap-fitted on cup 1, the flanges 10 and 13 are in face-to-face clamping relation.

10

le view  
ails of

15

ises a  
ose and  
2 for  
it 3, a  
lve 18  
in Fig.  
harness

20

Face seal 2 is of the form illustrated in Fig. 1. More particularly the ring is shaped for location on, and around, the flange 10 of cup 1. Seal 2 is formed of a core ring of soft foam-rubber 15 clad with flexible PVC 16, such that seal 2 is of cushion-like construction. This PVC cladding 16 has a skirt 17 (the purpose of which will be described) provided around the inner periphery of the ring-like face seal body and extending inwardly thereof. The width of skirt 17 is substantially the same as that of flanges 10 and 13.

25

d as a  
a flat  
a flat  
nwardly  
ion 8a  
2) is  
of the

Assembly of the half-mask is as follows, it being assumed that inlet valve 18 and outlet valves 5 have been located in position.

30

Firstly, face-seal 2 is mounted on the cup 1 by manipulating the skirt 17 of seal 2 such that it overlies flange 10 of cup-like body 1. With the seal 2 so mounted on cup 1, a substantial part of the seal's ring like body is located on the side of flange 10 remote from the cup-shaped body 7.

.35

lastics  
and-off  
11 is  
ve that  
of the  
valves  
surface

- 4 -

Next, clamping element 3 is snap-fitted onto cup 1 thus ensuring that skirt 17 is securely clamped between flanges 10 and 13 thereby fixing seal 2 in position. With clamping element 3 located in position, guard portion 12 serves to protect valves 5 whilst allowing passage of air from the valves 5.

Assembly is completed by screwing cartridge 4 into projection 8a and finally attaching harness straps 6 to studs 14.

The assembled mask is of course worn with the seal 2 locating over the bridge of the nose and around the mouth of a wearer, the mask being supported in position by the harness straps 6 locating around the back of the wearers head. When the mask is worn, these harness straps 6 'pull' the clamping element 3 towards the face of the wearer thus enhancing the clamping action.

During inhalation, air is drawn through (and thus filtered by) the cartridge 4. Exhaled air is exhausted via the outlet valves 5.

It is inevitable that seal 2 will lose its effectiveness after repeated usage of the mask. With the illustrated mask construction, the seal may be replaced quickly and easily by releasing and removing clamping element 3 from cup 1 (after removal of cartridge 4 if necessary), removing the old seal, fitting a new one, and re-assembling the mask. Consequently there is no need to dispose of the mask once the seal loses its effectiveness.

The illustrated mask has a cushion-like seal. Other types of seal could however be used, e.g. inflatable seals or reflex-edge seals.

to cup  
lamped  
2 in  
d in  
ives 5  
  
dge 4  
arness  
  
h the  
e and  
being  
ps 6  
When  
the  
wearer  
  
(and  
ir is  
  
its  
With  
ay be  
oving  
l of  
seal,  
mask.  
mask  
  
seal.  
e.g.

CLAIMS:

51. A respirator having a cup-like body associated with an air inlet and an air outlet and having a peripheral sealing element shaped for location across the nose and around the mouth of a wearer wherein the sealing element is located in position by a clamping element which is releasably secured to the cup-like body.
102. A respirator as claimed in claim 1 wherein the cup like body has a cup for location over the mouth and across the nose of a wearer and a first flange extending around the periphery of the cup said clamping element locates around the cup and has a second flange, and a portion of said sealing element is clamped between said first and second flanges.
153. A respirator as claimed in claim 2 wherein the cup has a front face having an aperture therein, said aperture being extended by an inwardly directed tubular projection forming the air inlet and in which is provided an inhalation valve.
204. A respirator as claimed in claim 3 wherein a filter cartridge is supported in said tubular projection.
255. A respirator as claimed in claim 2 wherein the cup has a flat basal surface having at least one aperture in which is located an exhalation valve.
306. A respirator as claimed in claim 5 wherein the clamping element has a guard portion for protecting the exhalation valve.
357. A respirator as claimed in any one of claims 1 to 6 wherein the clamping element and the cup like body have complimentary snap fit formations for effecting said releasable securement.
8. A respirator as claimed in any one of claims

- 6 -

1 to 7 wherein the sealing element comprising a ring of soft foam rubber clad with a flexible plastics material.

5 9. A respirator as claimed in claim 8 wherein the flexible plastics material is PVC.

10 10. A respirator as claimed in any one of claims 1 to 9 wherein the clamping element is provided with studs for the securement thereto of a harness for location around the back of the head of a wearer of the mask.

15

20

25

30

35



ing a ring  
e plastics

8 wherein

of claims  
vided with  
arness for  
wearer of

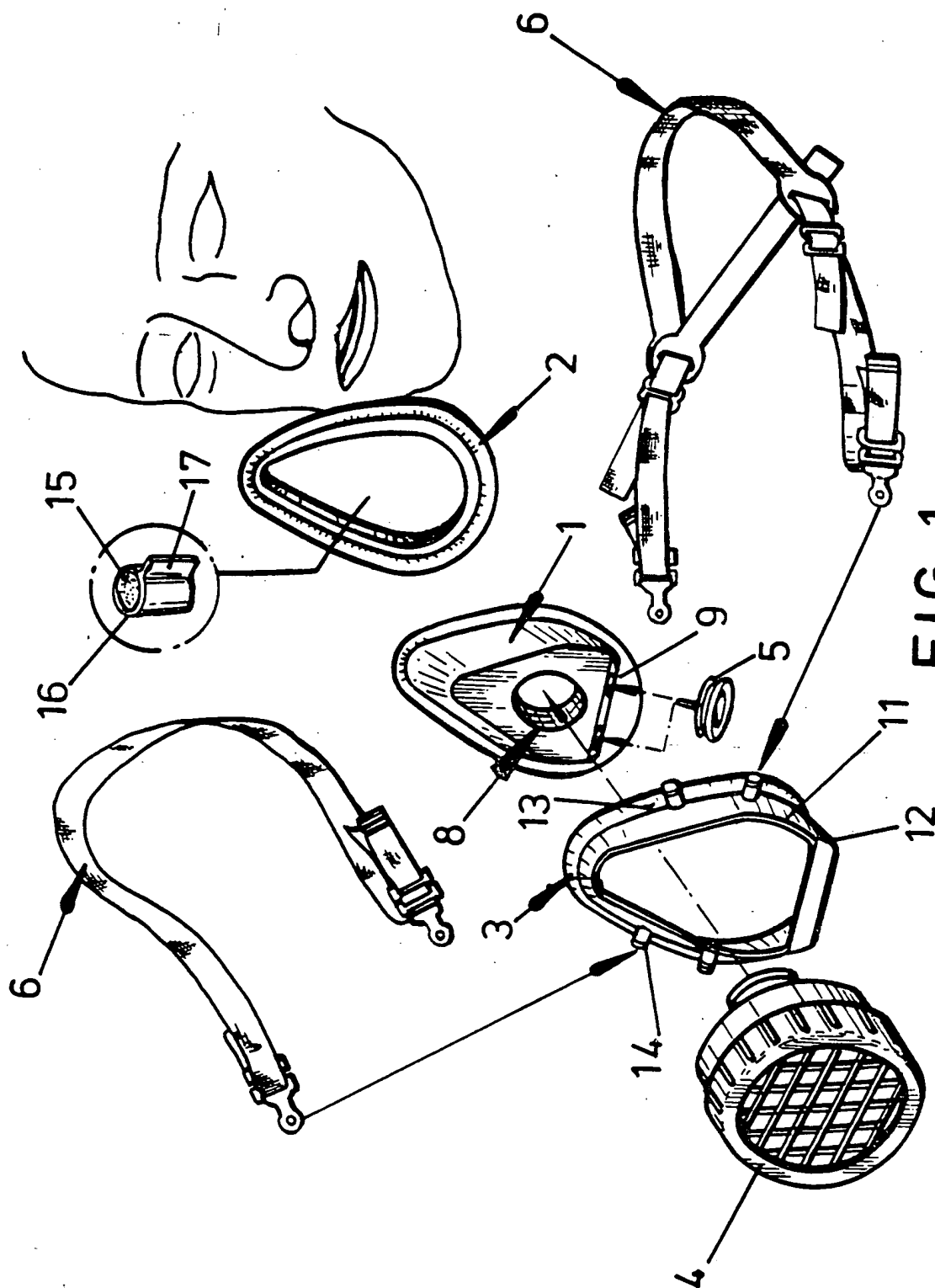
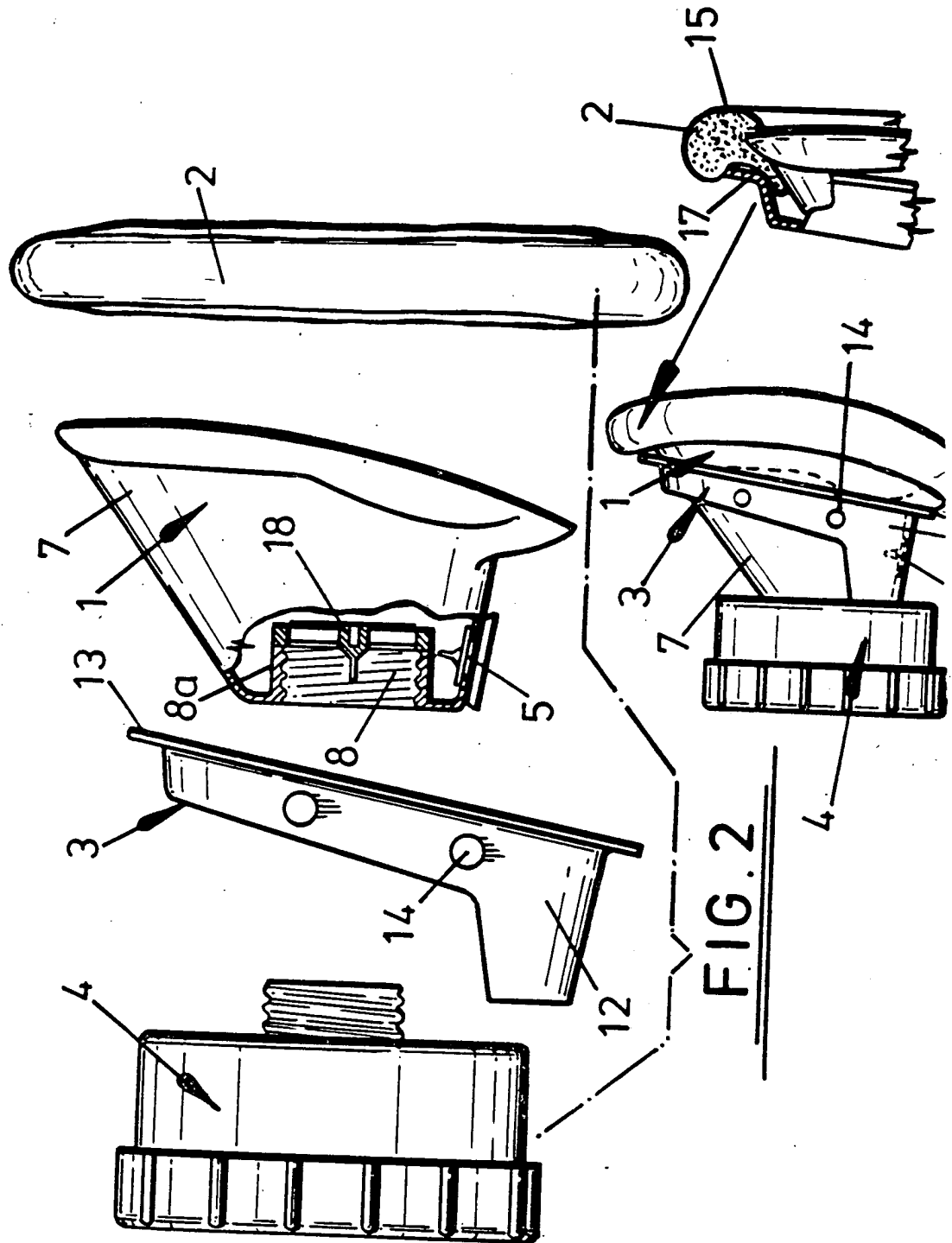


FIG. 1



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 86/00576

**I. CLASSIFICATION OF SUBJECT MATTER** (If several classification symbols apply, indicate all)  
According to International Patent Classification (IPC) or to both National Classification and IPC

IPC<sup>4</sup>: A 62 B 18/02

**II. FIELDS SEARCHED**

Classification System	Minimum Documentation Searched <sup>7</sup>
IPC <sup>4</sup>	Classification Symbols
A 62 B	

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>

**III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>**

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with Indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X, Y	DE, C, 207751 (WESTFALIA A.G.) 27 July 1907, see page 1; figures 1,2	
Y	US, A, 2823671 (GARELICK, J.J.) 18 February 1958, see column 2, line 23 - column 3, line 46; figures 1,5	1,2,3-7
A	US, A, 2931356 (SCHWARZ, K.H.) 5 April 1960, see column 3, lines 10-34; figures 3,4	1-7
A	US, A, 3545436 (HOLLOWAY, R.L.) 8 December 1970	1,8
A	DE, C, 334138 (DRAEGER, A.B.) 9 March 1921	
A	DE, C, 702315 (AUERGESELLSCHAFT) 22 January 1936	
	-----	

<sup>10</sup> Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

**IV. CERTIFICATION**

Date of the Actual Completion of the International Search

10th December 1986

International Searching Authority

EUROPEAN PATENT OFFICE

Date of Mailing of this International Search Report

22 JAN 1987

Signature of Authorized Officer

M. VAN MOL

INTERNATIONAL APPLICATION NO.  
-----PCT/GB 86/00576 (SA 14685)  
-----

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 18/12/86

The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C- 207751		None	
US-A- 2823671		None	
US-A- 2931356		None	
US-A- 3545436	08/12/70	None	
DE-C- 334138		None	
DE-C- 702315		None	